

Capasso 68-107-2-21-3-37
Serial No. 09/883,542

Claim Listing

1 1. (currently amended) A heterogeneous intersubband (HISB) optical device having a
2 predetermined function, said device comprising
3 a multiplicity of stacked intersubband (ISB) optical sub-devices, characterized in that
4 at least two of said sub-devices include radiative transition regions that have different
5 individual optical gain/loss profiles, and
6 said individual gain/loss profiles are mutually adapted to generate said predetermined
7 function.

1 2. (original) The invention of claim 1 wherein said sub-devices have a set of
2 characteristic parameters including the peak energy of the ISB transitions therein, the position of
3 each sub-device in the stack, the oscillator strengths of said transitions, the energy bandwidth of
4 said transitions, the length of said sub-devices, and the doping levels of said sub-devices, said
5 individual gain/loss profiles being determined by mutually adapting said parameters.

1 3. (original) The invention of claim 1 wherein said HISB device is designed to operate
2 in conjunction with a second device having a gain/loss characteristic over a particular
3 wavelength range, said individual gain/loss profiles being mutually adapted to generate said
4 predetermined function as a gain/loss characteristic in said HISB device that compensates for
5 said gain/loss characteristic of said second device.

1 4. (original) The invention of claim 1 wherein said HISB device is designed to operate
2 in conjunction with a second device having a nonlinear refractive index characteristic over a
3 particular wavelength range, said individual gain/loss profiles being mutually adapted to generate
4 said predetermined function such that said HISB device has a nonlinear refractive index
5 characteristic that compensates for said nonlinear refractive index characteristic of said second
6 device.

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1 5. (original) The invention of claim 1 wherein said individual gain/loss profiles are
2 mutually adapted to generate said predetermined function as a relatively flat gain/loss profile
3 over a particular wavelength range.

1 6. (original) The invention of claim 1 wherein said HISB device comprises a laser for
2 simultaneously operating at a plurality of different wavelengths.

1 7. (previously presented) The invention of claim 6 further comprising a transmitter that
2 includes said HISB device, a utilization device for receiving radiation at said wavelengths
3 generated by said HISB device, and a transmission medium for optically coupling said
4 transmitter to said utilization device.

1 8. (original) The invention of claim 6 wherein said individual gain/loss profiles are
2 mutually adapted to generate said predetermined function as a gain profile that exhibits peaks at
3 a multiplicity of said different wavelengths.

1 9. (previously presented) The invention of claim 7 wherein said transmitter and said
2 utilization device operate on the basis of wavelength division multiplexing of a multiplicity of
3 channels, and radiation at each of said wavelengths emitted by said HISB device correspond to
4 one of said channels.

1 10. (original) The invention of claim 1 wherein each of said ISB sub-devices includes a
2 radiative transition region and an injection/relaxation region adjacent thereto.

1 11. (currently amended) A heterogeneous intersubband (HISB) optical device having a
2 predetermined gain/loss or nonlinear refractive index profile, said device comprising
3 upper and lower cladding regions,
4 a core region including a multiplicity of intersubband (ISB) active regions stacked
5 between said cladding regions, each of said active regions including a plurality of radiative
6 transition regions and interleaved therewith a plurality of injection/relaxation regions,

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7 means forming an optical cavity resonator, said active regions being located within said

8 resonator, characterized in that

9 at least two of said active regions including radiative transition regions that are different
10 from one another, said active regions having a set of characteristic parameters including the peak
11 energy of the ISB transitions therein, the position of each of said sub-devices in the stack, the
12 oscillator strengths of said transitions, the energy bandwidth of said transitions, the length of said
13 active regions, and the doping levels of said regions, and wherein said parameters are mutually
14 adapted to generate said predetermined profile.